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ALFALFA VARIETIES
AND
SEED SUPPLY

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ALFALFA VARIETIES AND SEED SUPPLY

B. A. MADSON¹

This circular has been prepared in response to requests for information on the comparative value and adaptability of varieties and strains of alfalfa for California conditions; the value of seed from different sources; the factors which must be considered in selecting good seed; and the steps by which the buyer may be enabled to secure seed of the kind and quality desired. Unfortunately these questions cannot be answered satisfactorily; but field observations covering a number of years, and the experience of farmers in various parts of the state, have furnished a body of information which should be of some value to growers of alfalfa.

VARIETIES OF ALFALFA GROWN IN CALIFORNIA

Besides the common or Chilean alfalfa, imported in the early fifties, and which is the most important variety grown, a number of other varieties have been introduced from time to time. A few of these have found a permanent place in our agriculture, but most of them through lack of any special merit, have been discontinued. Next in importance to the common alfalfa is Hairy Peruvian, which possesses advantages in certain sections and under certain conditions. The Grimm alfalfa also exhibits some superiority over other varieties in certain districts, although the information now available does not warrant its definite recommendation.

Common Alfalfa.—The common alfalfa constitutes the major portion of the crop grown in California. It meets the conditions and needs here so well that it is unlikely to be replaced in most sections by any other variety now available. It is well adapted to nearly all sections of the state; produces excellent yields; is, on the whole, leafy and fine-stemmed; and, if properly handled, makes hay of excellent quality. The grower should remember, however, that common alfalfa is extremely variable and is not a pure or uniform variety in the accepted sense of the term. Any field contains many plants which vary markedly from the average. Specimens with large, coarse stems,

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with leaves of a different shape, or with more hairy leaves and stems, are common. Such variants probably do not seriously affect the yield or quality of the product.

Hairy Peruvian.—The Hairy Peruvian alfalfa was introduced from Peru by the U. S. Department of Agriculture about 1905, and was brought into cultivation in Arizona and California a few years later. Because of its longer period of growth and its apparent vigor and high yielding capacity, it appeared likely at that time to replace the common in many sections of the southwest. Certain undesirable characteristics, however, have caused its popularity to decline in recent years, and at present it is grown much less extensively than formerly. It does possess, however, distinct advantages in sections with a long growing season and mild winters.

One of the chief virtues of Hairy Peruvian alfalfa is its ability to grow at a somewhat lower temperature than the common; it therefore starts growth earlier in the spring and continues later in the fall. Where the winters are mild, it may continue growth throughout the season, producing an appreciable quantity of winter feed or pasture when little would be produced by common alfalfa. Where the growing season is long, as in the Imperial Valley, and in other sections of southern California, it will produce one or two more cuttings per season and considerably higher yields. In the central and northern parts of the state, however, it has failed to show any superiority in these respects over the common.

The chief objection to the Hairy Peruvian is that the stems are usually coarser and less leafy than those of the common alfalfa, and unless the stand is very dense, a poorer quality of hay is produced. In addition the crowns are usually smaller, the number of stems per plant less, and the life of the plant shorter—factors which increase the difficulty of maintaining a sufficiently dense stand to assure a good quality of hay.

The most distinctive difference between the Hairy Peruvian and the common is that the stems and foliage of the former are covered with coarse hairs which impart to the plant a silvery-gray appearance. Common alfalfa also bears hairs on the leaves and stems, especially on the upper portion of the plant; but as a rule they are less numerous and less conspicuous.

This character makes a field of Hairy Peruvian alfalfa relatively easy to distinguish from a field of the common. Individual plants of the two varieties are, on the other hand, extremely difficult to dis-

tinguish because, as has already been noted, common alfalfa is extremely variable, and individual plants may be coarse-stemmed and hairy and may in general possess characters usually attributed to the Peruvian. There seems to be no single botanical character which makes it possible to distinguish with certainty between individuals of the two varieties. The foliage of the Peruvian is usually darker in color, the leaflets narrower, and the flower a deeper purple; but these characters are only relative and not constant for either variety. The common belief that the Hairy Peruvian has hollow stems while the common has solid stems is not correct. Large, coarse stems of either variety may have a central cavity, but are usually filled with a soft, large-celled pith. The great variability of both varieties, therefore, makes it practically impossible to detect a small percentage of admixture of Hairy Peruvian in common, or vice versa, although a higher percentage can usually be detected.

The conditions, therefore, under which Hairy Peruvian may advantageously be used are found in those sections where the growing season is long, as in the extreme south, or where the winters are practically free from frost. Under these conditions it will produce somewhat larger yields and more winter feed. In other sections, especially where the quality of the hay is an important consideration, the common is to be preferred.

Grimm Alfalfa.—Grimm alfalfa has been grown very little in California, and not enough is known regarding its behavior to warrant specific statements or recommendations concerning it. In general, it resembles the common quite closely, even to the color of the flowers; but interspersed will be found plants with white, green, yellowish green or dark, smoky purple flowers. It has a long dormant period, becoming dormant early in the fall and not resuming growth until rather late in the spring. Even under the most favorable conditions, it makes no growth whatever during the winter months. Its growing season, therefore, is much shorter than that of either of the two other varieties discussed.

Its chief virtue is its ability to withstand severe winters without injury, and for this reason it is the principal variety grown in such states as Idaho, Montana, and the Dakotas. The high resistance to low temperature is not necessary in California, and its shorter growing season might appear to be a disadvantage, and materially to reduce the yield as compared with varieties of longer season. This is, however, not necessarily the case. Tests in Mendocino County have, in

fact, indicated that for that section at least it is superior to the common. Whether the same would prove true in other sections is not known, but until further information is available, the Grimm variety cannot be recommended for general use. The common belief that its more branched and spreading root system causes it to do better on soils with a high water table, is not borne out by the experience of other states.

SOURCES OF SEED

Another question upon which information is continually sought is the comparative value of seed from different sources for use in California. This applies particularly to common alfalfa, which constitutes more than 80 per cent of the crop of the state. While but little definite information is available, certain facts and principles will guide the farmer in buying seed.

As already pointed out, the alfalfa plant is extremely variable, and experience has shown that under certain climatic conditions its nature and habits may in the course of time be profoundly modified. The best illustration is in the case of winter hardiness. Common alfalfa which has been grown for a number of generations in regions where the winters are severe, as in the central or northern Great Plains, is much more winter-hardy than alfalfa grown in California or Arizona. Along with this greater hardiness go a longer period of dormancy and a shorter period of growth. A process of natural selection has eliminated the weaker and less hardy strain, and only the more hardy have survived. As winter hardiness is, under California conditions, not necessarily a virtue, and as a long period of dormancy is usually a disadvantage, we should not expect such strains to do so well in California as the less hardy local grown strains, and the limited data available bear out this contention. Conversely, southern-grown common alfalfa is less suitable for the Great Plains because of its susceptibility to winter injury.

Imported seed may show variations even greater than those mentioned, according to the country of its origin; and its use is never to be recommended as long as good local seed is available.

Limited comparison with seed from different sections of the southwest has shown no apparent difference in the length of the growing season or the characteristics of growth when seed from different sections of California, Arizona, or even Utah was used. Apparently good seed from any portion of the southwest can be planted with equal

safety and with equal expectation of satisfactory results. Seed from Utah did show a slightly shorter period of growth, although the difference has not been sufficient to affect the yield appreciably. As with most other field crops, however, it is advisable to use seed grown under conditions closely similar to those under which it is to be planted.

Other factors besides the period of growth and yield must of course, be considered, and may be of greater importance. Particularly is this true of variety, purity, and the prevalence of noxious weeds.

CHARACTERISTICS OF GOOD ALFALFA SEED

Good alfalfa seed should be free from weed seeds and other impurities, should be of good quality and of high germination, and should be as pure as possible as to variety.

Weed Seeds and Foreign Matter.—Weed seeds are always objectionable in alfalfa seed, but particularly is this true of noxious weeds which may become permanent pests, or which may interfere with the growth of the alfalfa itself. Weed seeds may occur in alfalfa seed from any section of the country, but by due precautions they can be avoided. The careful seed grower does not allow objectionable weeds, especially those whose seed cannot be readily removed, to mature in the alfalfa field. Seed dealers also are usually well equipped to remove weed seed, and other foreign material from seed, although certain weed seeds, for example some of the dodders, cannot be removed with any degree of success.

As an added safeguard to the buyer, the California Seed Law requires that the seller place on each lot of agricultural seed a label which shall show, along with other information, the percentage of total weed seed present, and shall give the name of each kind of noxious weed seed present when such content is above 90 seeds per pound for alfalfa. The California Seed Law has established a certain minimum noxious weed seed content for each type of agricultural seed. When the noxious weed seed content falls below this minimum, the law does not require that it be named on the label. Herein lies a source of danger, and in this regard it would be wise for all agricultural interests of the state to urge that this law be so amended as to require that any noxious weed seed content, no matter how small, be shown.

Before purchasing seed, the buyer should always read the information given on the label and, if he deems it advisable, should secure a

sample and have tests made for his own information (fig. 1). He should not buy seed that is not labelled, and should not plant seed containing weeds that are likely to become troublesome.

Foreign material other than weed seeds usually can be removed in the cleaning process. Small amounts are not seriously objectionable, except that they may serve as a means of transporting certain diseases

○		
Common name	<i>Alfalfa</i>	
Purity	<i>97.6</i>	%
Weed seeds	<i>1.2</i>	%
Names of Noxious weeds	<i>Dodder</i>	
Germination	<i>92.4</i>	%
Date of "	<i>Febr.</i>	<i>1929</i>
	Month	Year
Vendor	<i>John Doe Seed Co.</i>	
Address	<i>Davis, Calif.</i>	

Fig. 1.—The type of label which, according to Section 2 of the California Seed Law, the dealer must place on each lot of alfalfa seed offered for sale.

such as bacterial wilt. As far as known none of the serious alfalfa diseases are seed-borne, but diseases such as bacterial wilt can easily be carried in bits of stem or leaves which remain in the seed. The best procedure, of course, is not to use seed from sections where this disease is known to be present.

Quality and Germination.—Alfalfa seed should be plump, uniform, and practically free from small, shriveled, or immature seed. Fresh

seed is usually olive green in color, but may be dark green or brown. Seed which is old or has been exposed to rain will be darker in color than normal, but color is not important if the seed germinates well (i.e., around 90 per cent). The dealer is required to state on the label the percentage of germination as well as the weed seed content.

Some lots of alfalfa contain a considerable percentage of what is known as hard seed. Although such seed is usually sound, the hardness of the seed coat prevents it from absorbing water readily; hence its germination is delayed. A small percentage of hard seed is not seriously objectionable, but a large proportion necessitates a heavier rate of seeding to insure a good stand. The percentage of hard seed varies with seasonable conditions and also appears to be more prevalent in seed grown in some sections than in others.

Purity of Variety.—With alfalfa, as with all other field crops, a pure, uniform variety is highly desirable, yet much of the alfalfa seed is evidently a mixture, mainly of common and Hairy Peruvian. Such a mixture may for a time yield satisfactorily; but as the two varieties do not reach the proper stage for cutting at the same time, the result is invariably a poorer quality of hay than could be obtained from either alone. Furthermore, since the Hairy Peruvian is naturally shorter lived, its presence as a mixture in the common alfalfa is undoubtedly a factor in the premature thinning of the stand.

Just how much of the alfalfa seed used in California is mixed is not known, and would be extremely difficult to determine. The principal objection to the use of seed from some sections of the Southwest is that much of it is mixed, as an examination of fields sown with such seed clearly shows. This holds true for seed from sections where the varieties are grown indiscriminately, but at present there is no way of segregating the pure seed from the mixture.

AGENCIES WHICH AID THE GROWER IN SECURING GOOD SEED

California Seed Law.—As has already been stated, the California Seed Law offers a considerable measure of protection to the buyers of seed in that it requires that each lot of agricultural seed, when sold or offered for sale, bear a label stating: the commonly accepted name; the percentage by weight of purity, meaning the freedom from other kinds of seed or inert matter; the percentage by weight of weed seeds; the name of each kind of noxious weed seed when present above a specified minimum; the percentage of germination of such agricultural seed along with the date that such germination test was made; and the name and address of the vendor selling the seed.

Under the present law, if there are less than 90 noxious weed seeds present per pound of alfalfa seed, the noxious weed seed need not be named on the label, so that complete protection to the buyer is not provided. The seed law is a labelling law and does not prevent the sale of poor seed, but it does provide information regarding the germination and purity of the commodity. As a further safeguard, the purchaser of seed may submit samples of about one-half pound to the Seed Laboratory of the State Department of Agriculture at Sacramento for tests, in order to avoid the purchase of seed containing even small quantities of various weed seeds.

Federal Staining Law.—Recent Federal enactment requires that all imported seed be stained a predetermined color, this being distinctive for each country. This provision makes it readily possible to distinguish imported from domestic seed, but does not prevent the sale of this cheaper imported seed to those who may desire it.

Seed Verification Service.—The Seed Verification service was inaugurated in October, 1927, by the Bureau of Agricultural Economics of the U. S. Dept. of Agriculture to give the buyers of alfalfa and clover seed proper assurance as to the origin of such seed. The service was aimed primarily to correct conditions in the east and middle west, where alfalfa and clover seed from many different states came into direct competition, and where substitution of seed from one source for that from another was not uncommon, so that the buyer could not be sure of the origin of the seed which he was buying.

The announcement of this service by the Bureau states that “Under this service the origin of a given lot of seed sold by an authorized vendor of inspected seed may, by an examination of records by a federal seed inspector, be traced back to the place the seed is produced. Such records should cover all lots of seed from the time they are received from the growers until they leave the seedsmen’s warehouse. In addition to the records themselves, files of samples of all lots offered for sale would afford another check on the identity of these lots.

“Under the proposed plan, seedsmen who comply with the regulations and provisions of the department governing the service may issue U. S. Verified-Origin Seed certificates on seeds which have been previously verified as to origin by an authorized inspector.”

The situation in California is, however, not nearly so bad as it was in the east and middle west. Here most of the seed used is grown either within the state or in adjoining states, and limited tests fail to show any appreciable difference in the crop from good seed from any

of the usual sources. Although seed from states with long cold winters will produce a crop with a slightly longer period of dormancy than local seed, the quantity of such seed sold in the state is small.

The adoption of the service, would, however, be a material aid in eliminating variety mixtures, as seed from some sources is admittedly more likely to consist of such mixtures than seed from others. While

VERIFIED-ORIGIN SEED CERTIFICATE

Issued by Authority of the

United States Department of Agriculture

This is to certify that this lot of seed has been verified as to origin by a Federal Seed Inspector and that the facts stated below are in conformity with those given on the certificates issued by him, as shown by our records.

Kind of seed Lot No.....

Where grown

**PROGRESSIVE SEED COMPANY
SUCCESS, ILLINOIS**

VERIFIED-ORIGIN SEED CERTIFICATE

Issued by Authority of the

United States Department of Agriculture

This is to certify that this lot of seed has been verified as to origin by a Federal Seed Inspector and that the facts stated below are in conformity with those given on the certificates issued from the district office named below, as shown by the records of the dealer holding such certificates.

Kind of seed Lot No.....

Where grown

**U. S. SEED VERIFICATION SERVICE
KANSAS CITY, MISSOURI**

Fig. 2.—Tag forms of verified-origin seed certificates.

this fact is known, the buyer very often cannot be certain that he is getting seed from the source expected, as substitution is apparently rather common. During the past few years, for example, seed from Modoc County has enjoyed a run of popularity, and there is strong indication that considerably more Modoc seed has been sold than the district has produced. Apparently seed from other sources is being sold as Modoc seed on the strength of its popularity, the vendors well knowing that the substitution cannot be detected. There is no evi-

dence that Modoc-grown seed will produce any better crops than good seed from other sections, but many buyers have learned from experience that it is less likely to consist of objectionable mixtures than seed from other sources.

The verified origin service as now applied requires only that the state in which the seed originated be named. Nevertheless its use would be of material aid to those who wished to avoid mixed seed, since a large portion of such seed originates outside of the state. The greatest service would, however, be rendered if the district in which the seed originated were given, as well as the state, but it is questionable whether this can be done unless such a service be established under our own state laws.

Up to the present time seed verification has received but little consideration in California, and its future use will depend entirely upon public demand. Its adoption by the seedsman is voluntary, and as it entails considerable expense, and the maintenance of an elaborate system of records (fig. 2), it is not likely to be adopted unless actually demanded by farmers and other buyers of alfalfa seed. It deserves thoughtful consideration. General use of the service would practically eliminate from the markets of California the seed from those sections where variety mixtures were known to prevail. Furthermore, it would serve to stimulate competition between the various seed-producing districts, and would encourage the producers of seed to purify their fields, and to place on the market the most uniform seed possible.

MEANS OF SECURING PURE VARIETIES

The Seed Verification Service, although helpful in eliminating objectionable mixtures, cannot solve our variety problem. Our common alfalfa itself is extremely variable, and no one can state definitely how much, if any, of the seed available, is of one variety. Furthermore, such varieties as Turkestan, Smooth Peruvian, and the like, introduced in years gone by, and grown indiscriminately throughout the state, were almost identical with common alfalfa in appearance, and doubtless are present as mixtures in common alfalfa in many sections. Possibly the extreme variability in many of our alfalfa fields results from mixtures and crosses with these early introductions.

Before seed of pure varieties can be definitely assured, a well organized program of purification is necessary. The varieties which we grow should be subjected to rigorous selection, and the best strain

thus obtained should be grown under a properly organized system of field inspection and certification. Such a program will require not only considerable time, but also the close cooperation of the various agencies interested in better alfalfa. Similar methods have produced excellent results with other field crops, and there is reason to believe that if properly carried out such a program would improve materially the yield and quality of our alfalfa crop, and probably aid also in the solution of many of our other alfalfa problems. Certainly in no other way can pure, uniform varieties be obtained.

In summarizing the alfalfa problems in California, it must be remembered that not all the difficulties encountered by growers result from poor seed or mixed varieties. There is an intermingling of factors that are difficult to segregate. In many cases certain soil or moisture conditions, combined with cultural methods practiced, bring unsatisfactory results as to plant vigor, longevity of stands, or hay production.

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- 277. Head, Cane, and Cordon Pruning of Vines.
- 278. Olive Pickling in Mediterranean Countries.
- 279. The Preparation and Refining of Olive Oil in Southern Europe.
- 282. Prevention of Insect Attack on Stored Grain.
- 284. The Almond in California.
- 287. Potato Production in California.
- 288. Phylloxera Resistant Vineyards.
- 289. Oak Fungus in Orchard Trees.
- 290. The Tangier Pea.
- 292. Alkali Soils.
- 294. Propagation of Deciduous Fruits.
- 295. Growing Head Lettuce in California.
- 296. Control of the California Ground Squirrel.
- 298. Possibilities and Limitations of Cooperative Marketing.
- 300. Coccidiosis of Chickens.
- 301. Buckeye Poisoning of the Honey Bee.
- 302. The Sugar Beet in California.
- 304. Drainage on the Farm.
- 305. Liming the Soil.
- 307. American Foulbrood and Its Control.
- 308. Cantaloupe Production in California.
- 309. Fruit Tree and Orchard Judging.
- 310. The Operation of the Bacteriological Laboratory for Dairy Plants.
- 311. The Improvement of Quality in Figs.
- 312. Principles Governing the Choice, Operation and Care of Small Irrigation Pumping Plants.
- 313. Fruit Juices and Fruit Juice Beverages.
- 314. Termites and Termite Damage.
- 315. The Mediterranean and Other Fruit Flies.